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(54) Title: HYPOXIC FIRE SUPPRESSION SYSTEMS AND BREATHABLE FIRE EXTINGUISHING COMPOSITIONS

**WO 01/78843 A3**

(57) Abstract: Fire prevention and suppression systems and breathable fire-extinguishing compositions are provided for rooms, houses and buildings, transportation tunnels and vehicles, underground and underwater facilities, marine vessels, submarines, passenger and military aircraft, space stations and vehicles, military installations and vehicles, and all other human occupied objects and facilities. The system provides a breathable hypoxic fire-preventative atmosphere at standard atmospheric or local ambient pressure. The system employs an oxygen-extraction apparatus supplying oxygen-depleted air inside a human-occupied area or storing it in a high-pressure container for use in case of fire. A breathable fire-extinguishing composition is introduced for constant fire-preventive environments, being mostly a mixture of nitrogen and oxygen and having oxygen content ranging from 12 % to 17 %. A fire-suppression system is provided employing a fire-extinguishing composition with oxygen concentration under 16 %, so when released it creates a breathable fire-suppressive atmosphere having oxygen concentration from 10 % to 16 % with possible addition of carbon dioxide. A technology for automatically maintaining a breathable fire-preventive composition on board a human-occupied hermetic object is provided by introducing inert ballast that automatically maintains oxygen content under the Hypoxic Threshold. An aircraft fire suppression system utilizing a hypoxic fire suppression agent is provided for producing breathable atmosphere onboard having fire-extinguishing properties.

**INTERNATIONAL SEARCH REPORT**

Int. Application No  
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**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 A62D1/06	A62C3/00	E21F5/00	A62D1/00	A62C39/00
A62C3/08	A62C3/07			

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A62D A62C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

WPI Data, PAJ, EPO-Internal

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 301 464 A (AIR PROD & CHEM) 1 February 1989 (1989-02-01) page 3, line 10 - line 21 page 4, line 23 -page 6, line 26 claims 1-6	1-5,11, 29,32-34
Y	---	1-34
X	WO 99 47210 A (WAGNER ERNST WERNER ;WAGNER ALARM SICHERUNG (DE)) 23 September 1999 (1999-09-23)	1-3,5,6, 9,11,12, 14,15, 19,20, 23,28, 31,32
	page 1, line 1 -page 2, line 9 page 3, line 13 - line 16 page 3, line 34 -page 7, line 6 ---	-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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- \*&\* document member of the same patent family

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## INTERNATIONAL SEARCH REPORT

Int. Application No  
PCT/IB 01/01505

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 2 748 396 A (ABB FLAKT) 14 November 1997 (1997-11-14)  page 1, line 1 - line 9 page 1, line 30 - line 33 page 2, line 35 -page 3, line 7 page 3, line 25 - line 27 page 4, line 3 - line 7 ---	1,2,5,6, 9-12,14, 15,19, 20,23, 24,28-34
X	US 3 893 514 A (CARHART HOMER W ET AL) 8 July 1975 (1975-07-08) column 1, line 5 - line 16 column 1, line 36 - line 45 column 1, line 62 -column 2, line 17 column 2, line 42 -column 3, line 12 column 3, line 46 - line 49 column 4, line 27 - line 33 ---	1-3,15, 31,32,34
X	US 3 715 438 A (HUGGETT C) 6 February 1973 (1973-02-06) column 1, line 12 - line 24 column 2, line 3 - line 28 column 2, line 41 - line 67 column 4, line 29 - line 51 ---	1-3
X	US 5 887 439 A (KOTLIAR IGOR K) 30 March 1999 (1999-03-30) column 1, line 51 -column 2, line 23 column 2, line 33 - line 34 column 3, line 48 -column 4, line 24 column 5, line 13 - line 32 column 6, line 3 - line 9 ---	1
Y	WO 96 37176 A (KOTLIAR IGOR K) 28 November 1996 (1996-11-28) page 1, line 3 - line 9 page 5, line 12 - line 24 ---	1-34
Y	WO 98 34683 A (HYPOXICO INC) 13 August 1998 (1998-08-13) page 1, line 14 - line 18 page 2, line 22 - line 24 page 4, line 15 - line 31 ---	1-34
Y	US 5 799 652 A (KOTLIAR IGOR K) 1 September 1998 (1998-09-01) figures 9,10 ---	1-34
Y	EP 0 234 056 A (BOEING CO) 2 September 1987 (1987-09-02) the whole document ---	25-28

-/-

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB 01/01505

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 121 790 A (GRAHAM EDWARD F) 24 October 1978 (1978-10-24) the whole document ---	15-28
Y	EP 0 374 333 A (GABILLET ANDRE) 27 June 1990 (1990-06-27) the whole document ---	15-28
P,X	DATABASE WPI Section Ch, Week 200038 Derwent Publications Ltd., London, GB; Class K01, AN 2000-435704 XP002192639 & JP 2000 153004 A (KAWASHIGE BOSAI KOGYO KK), 6 June 2000 (2000-06-06) abstract -----	1

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

Int. Application No

PCT/IB 01/01505

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
EP 0301464	A	01-02-1989	US 4807706 A AT 90003 T BR 8804020 A CA 1308893 A1 DE 3881445 D1 DE 3881445 T2 DK 424088 A EP 0301464 A2 ES 2058189 T3 IL 87067 A JP 1058272 A JP 8017832 B KR 9204593 B1 MX 163364 A		28-02-1989 15-06-1993 28-02-1989 20-10-1992 08-07-1993 09-09-1993 01-02-1989 01-02-1989 01-11-1994 12-12-1991 06-03-1989 28-02-1996 11-06-1992 30-04-1992
WO 9947210	A	23-09-1999	DE 19811851 A1 AU 2725899 A CA 2301628 A1 WO 9947210 A1 EP 1062005 A1 NO 20000791 A PL 338246 A1		23-09-1999 11-10-1999 23-09-1999 23-09-1999 27-12-2000 17-02-2000 09-10-2000
FR 2748396	A	14-11-1997	FR 2748396 A1		14-11-1997
US 3893514	A	08-07-1975	NONE		
US 3715438	A	06-02-1973	CA 930535 A1 FR 2103250 A5 GB 1335582 A		24-07-1973 07-04-1972 31-10-1973
US 5887439	A	30-03-1999	US 5850833 A US 5799652 A US 5924419 A WO 9637176 A1 AT 209474 T CA 2227444 A1 DE 69617477 D1 EP 0959862 A1 WO 9703631 A1 US 5964222 A EP 0898486 A1 WO 9834683 A1		22-12-1998 01-09-1998 20-07-1999 28-11-1996 15-12-2001 06-02-1997 10-01-2002 01-12-1999 06-02-1997 12-10-1999 03-03-1999 13-08-1998
WO 9637176	A	28-11-1996	US 5850833 A WO 9637176 A1 US 5799652 A US 5924419 A US 5887439 A		22-12-1998 28-11-1996 01-09-1998 20-07-1999 30-03-1999
WO 9834683	A	13-08-1998	US 5924419 A EP 0898486 A1 WO 9834683 A1 US 5887439 A US 5964222 A		20-07-1999 03-03-1999 13-08-1998 30-03-1999 12-10-1999
US 5799652	A	01-09-1998	US 5850833 A AT 209474 T		22-12-1998 15-12-2001

## INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Application No

PCT/IB 01/01505

Patent document cited in search report	Publication date		Patent family member(s)	Publication date
US 5799652	A		CA 2227444 A1 DE 69617477 D1 EP 0959862 A1 WO 9703631 A1 US 5924419 A US 5887439 A US 5964222 A WO 9637176 A1	06-02-1997 10-01-2002 01-12-1999 06-02-1997 20-07-1999 30-03-1999 12-10-1999 28-11-1996
EP 0234056	A	02-09-1987	US 4726426 A DE 3676484 D1 EP 0234056 A1	23-02-1988 07-02-1991 02-09-1987
US 4121790	A	24-10-1978	NONE	
EP 0374333	A	27-06-1990	FR 2617230 A1 EP 0374333 A1	30-12-1988 27-06-1990
JP 2000153004	A	06-06-2000	NONE	